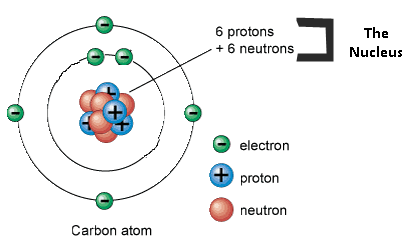
Atoms and Sub-Atomic Particles

An atom is the smallest particle of an element that has the element’s unique properties. Atoms contain three important subatomic particles. Atoms of an element have a unique number of protons, electrons and neutrons.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Particle Name | Location | Relative  Mass | Charge | How determined? |
| Proton | inside the nucleus | ≈2000 | +1 | = Atomic Number |
| Neutron | inside the nucleus | ≈2000 | 0 | = Atomic Mass –  Atomic Number |
| Electron | orbiting outside the nucleus | 1 | -1 | = Atomic Number |

Modern Model of the Atom

Carbon has 6 protons, 6 neutrons and 6 electrons. The modern model of the carbon atom looks like:



Standard atomic notation shows the atomic mass in the upper left corner above the element symbol, with the atomic number in the bottom left corner. For carbon the standard atomic notation is:



Atomic Number 🡪

Atomic Mass 🡪

Remember:

# protons = atomic number

# electrons = atomic number

# neutrons = atomic mass – atomic number

Let’s try it to put it all together – complete this chart!

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Element** | **Atomic Mass** | **Atomic Number** | **# of**  **Protons** | **# of Electrons** | **# of Neutrons** | **Standard Atomic Notation** |
| beryllium | 9 | 4 | 4 | 4 | 9-4=5 |  |
| aluminum |  |  |  |  |  |  |
| fluorine |  |  |  |  |  |  |

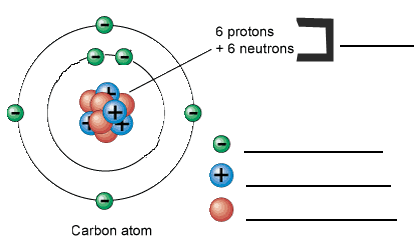
Atoms and Sub-Atomic Particles

An atom is the smallest particle of an element that has the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Atoms contain three important subatomic particles. Atoms of an element have a unique number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Particle Name | Location | Mass | Charge | How determined? |
| Proton |  |  |  |  |
| Neutron |  |  |  |  |
| Electron |  |  |  |  |

Modern Model of the Atom

Carbon has \_\_\_\_\_\_\_\_\_\_ protons, \_\_\_\_\_\_\_\_ neutrons and \_\_\_\_\_\_\_\_\_ electrons. The modern model of the carbon atom looks like:



Fill in the labels!

Standard atomic notation always shows the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in the upper left corner above the element symbol, with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the bottom left corner. For carbon the standard atomic notation is:



Atomic Number 🡪

Atomic Mass 🡪

Remember:

# protons = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# electrons = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# neutrons = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Let’s try it to put it all together – complete this chart!

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Element** | **Atomic Mass** | **Atomic Number** | **# of**  **Protons** | **# of Electrons** | **# of Neutrons** | **Standard Atomic Notation** |
| beryllium | 9 | 4 | 4 | 4 | 9-4=5 |  |
| aluminum |  |  |  |  |  |  |
| fluorine |  |  |  |  |  |  |

Complete the subatomic particles worksheet.

Read p 168 – 174 Pearson text. Complete the worksheet History – Developing a Model of the Atom V2.

**Subatomic Particles Worksheet**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Element** | **Symbol** | **Atomic Number** | **Atomic Mass** | **# of**  **Protons** | **# of Electrons** | **# of Neutrons** | **Standard Atomic Notation** |
| Helium | He | 2 | 4 |  |  |  |  |
| Oxygen | O |  | 16 | 8 |  |  |  |
| Sodium |  | 11 | 23 |  |  |  |  |
| Chlorine |  |  | 35 |  | 17 |  |  |
| Calcium |  |  |  |  | 20 | 20 |  |
|  | Li |  | 7 |  |  | 4 |  |
|  | C |  |  | 6 |  | 6 |  |
| Sulfur |  |  | 32 |  | 16 |  |  |
|  | Si | 14 |  |  |  | 14 |  |
| Argon |  |  | 40 | 18 |  |  |  |
| Silver | Ag |  | 108 | 47 |  |  |  |
| Uranium | U | 92 | 238 |  |  |  |  |

HISTORY – DEVELOPING A MODEL OF THE ATOM V2

Read the Pearson text p 168 – 174. Write a short point form summary of the important idea or discovery. Sketch the matching diagram if applicable.

| **SCIENTIST** | **YEAR(S)** | **MOST IMPORTANT IDEA(S) or DISCOVERY** | **DIAGRAM** |
| --- | --- | --- | --- |
| Democritus |  |  | **NOT APPLICABLE** |
| John Dalton |  |  |  |
| J.J. Thomson |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIST** | **YEAR(S)** | **MOST IMPORTANT IDEA(S) or DISCOVERY** | **DIAGRAM** |
| Ernst Rutherford |  |  |  |
| James Chadwick |  |  | Draw Rutherford’s model and include neutrons. |
| Niels Bohr |  |  | Draw the magnesium atom on p 174. |